DOCUMENT RESUME

ED 422 935 IR 057 093

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TITLE An Innovative Approach to Teaching Decisions Support Systems.
PUB DATE 1997-00-00
NOTE 10p.; In: Proceedings of the International Academy for Information Management Annual Conference (12th, Atlanta, GA, December 12-14, 1997); see IR 057 067.
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Business Administration Education; *Cooperative Learning; Course Descriptions; Course Evaluation; Curriculum Development; Decision Making; *Decision Support Systems; Higher Education; Information Technology; *Instructional Design; Instructional Innovation; *Problem Solving; Teamwork
IDENTIFIERS *Course Development

ABSTRACT

This paper describes the design, implementation, and subsequent redesign of an innovative MBA (Master's of Business Administration) Decision Support Systems course. The curriculum is developed around a collaborative, technology-based approach that emphasizes teamwork and problem solving to teach students the principles and applications of decision support systems. Problems encountered during implementation, adjustments made, lessons learned, and recommendations for educators are included. Benefits for students include: interacting with technology (Internet, GroupSystems, and Lotus Notes); learning current and emerging topics; and enhancing teamwork, collaboration and communications skills. A copy of the syllabus is appended. (Author/AEF)

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ED 422 935

AN INNOVATIVE APPROACH TO TEACHING DECISIONS SUPPORT SYSTEMS

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This paper describes the design, implementation, and subsequent redesign of an innovative MBA Decision Support Systems course. The curriculum is developed around a collaborative, technology-based approach that emphasizes teamwork and problem solving to teach students the principles and applications of decision support systems. Problems encountered during implementation, adjustments made, lessons learned, and recommendations for educators are included.

PURPOSE AND BACKGROUND

For the 1996-97 academic year, a new, innovative course in Decision Support Systems (DSS) for an MBA program was implemented. This course was designed to be able to adapt to the constantly changing Information Technology (IT) field. The course is required for students who are pursuing an Information Systems Management concentration and is an elective for all other MBA students. The original intent was to develop a course that would familiarize students with current DSS enabling them to make informed decisions/recommendations within their organizations while emphasizing the ever-evolving nature of the field.

Initially, the course was designed to be taught almost totally through collaboration and teamwork in order to augment the students' problem-solving and interpersonal communications skills which are among the skills that the business environment currently demands (Sriram & Coppage, 1992; Cougar, et al., 1995). Technology-based learning was incorporated to increase the group's decision confidence and satisfaction with both the decision and the group process (Pinsonneault & Kraemer, 1989). As the course was implemented and taught for two semesters, some significant changes were made. The course is currently at a point where it appears to be meeting the needs of the students and their organizations and its adaptive nature should enable it to continue to do so.

This paper will look at the original plans for the course and follow the implementation process and the evolution of the course. Successful and unsuccessful aspects of the course will be explored, and finally, lessons learned and recommendations for educators will be provided.

ORIGINAL COURSE DESCRIPTION

This section provides a general overview of the course and the theoretical foundations on which the course is based. Readers wishing additional detail are referred to Van Slyke and Kittner, 1996.

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Course Goals

The original purpose of the course was to provide an overview of the general concepts of DSS and the related decision-making tools such as Executive Information Systems (EIS) and Group Decision Support Systems (GDSS). The goals were to:

- Teach DSS concepts, including their proper application to business problems.
- Improve students' interpersonal communications, teamwork, critical thinking and problem-solving skills.

Course Structure

The entire course was designed to progress the students through the field of DSS using a group-based, collaborative approach to teaching. All assignments and exams were performed collaboratively. It has been found that students are able to practice important interpersonal skills by collaborating on course assignments and collaboration also increases the communications opportunities afforded the students (Norman & Spoher, 1996). In addition to these advantages of collaborative learning, increased complexity of thinking, acceptance of different ideas, and motivation to learn are thought be outcomes of collaborative learning experiences. A sense of connection among the students is an additional benefit of this learning process (Gamson, 1994).

In addition to the theoretical advantages, employing collaboration serves an important pragmatic purpose--preparing students for what they will encounter in the new organizational environment. Not only are organizations moving to more collaboration in the workplace (Kearns, 1989), but it has been found to increase the satisfaction with the learning process (Pinsonneault & Kraemer, 1989). In order to provide additional collaborative learning experiences, a case utilizing groupware was required with team members at a university in Mexico.

Groupware. A groupware lab, which included GroupSystems from Ventana Corporation and Lotus Notes, was being planned at the same time the course was being developed. Because of the anticipated availability of these popular groupware packages and their importance in the DSS field, the course was designed to fully integrate them into most activities.

Class meeting organization. Each three-hour class was comprised of three parts: 1) a group research project presentation, 2) a case preparation and presentation, and 3) an instructor presentation on a DSS topic. Additionally, students were required to submit a weekly experience log that recorded their thoughts on their class experiences. (See class syllabus, Appendix A.)

Research projects. Two group research projects on DSS topics were required of each student. The purpose of assigning these projects was both to provide students with an opportunity to obtain an in-depth understanding of the particular topic and also to provide the class with timely material not available in the text. The DSS topics were instructor selected with students then choosing from among the available topics. For one of the projects, the students were to collaborate using face-to-face communication while the other was to be prepared through the use of Lotus Notes. The purpose of the two distinct processes for project development was to provide the student with hands-on use of Lotus Notes as well as illustrate the advantages and disadvantages of teamwork through collaborative software. The research of the topic by the groups was intended to have them actively engaged in the learning process rather than be passive listeners. As the students researched the material, they would understand that because of the ever-evolving nature of the topics, an important segment of the information had not yet reached the textbooks. The amount of time it takes to write and publish a book makes much of the essential information for the class outdated. Sources other than the textbook needed to be used. The practical experience in group dynamics, communications, and collaboration that was provided by these projects was very beneficial.

After a 30-minute presentation by the group, the instructor would round out the coverage of the topic adding material not covered in the project presentation the group submitted. An outline of the group presentation was submitted the preceding week to enable the instructor to prepare the lecture. These discussions were in

the traditional lecture/discussion format, but GroupSystems was to be used to enhance student/instructor interaction.

Cases. Casework was a foundation of the class. By basing instruction on problem-solving activities as in case-based instruction, students are better able to experience the changes that come from learning new concepts. Case-based instruction also helps students improve their problem-solving skills (Bransford & Stein, 1993). The cases were designed to reinforce the various DSS topics. The students completed the cases in class after reading and thinking about the cases prior to class. All cases were completed by teams whose composition was dynamic--changing for each case. The team assignments were given at the beginning of the class period in order to eliminate prior preparation thus insuring teams equal preparation time. Teams were assigned to one of two modes of interaction--using GroupSystems or not using groupware support. During the semester, each student had several opportunities to experience both interaction modes. Teams were to present their case analysis using GroupSystems, with a team member acting as facilitator. This was to provide additional experience with the use of groupware, and the facilitator would gain experience and insight into the process of leading a group discussion using groupware. The casework would also provide an additional opportunity to engage in teamwork, whether groupware supported or not.

Experience logs. Students were required to maintain a log of their thoughts about their class-related experiences. The initial plan was for students to complete the experience logs using Notes. These logs were included to provide more hands-on experience with the technology and also to provide a valuable feedback mechanism (Edleson, et al., 1996). By monitoring the logs, the instructor gains insight into how well the class understands the course material. It also gives the students the opportunity to express concerns, ask questions and most importantly, reflect on their experiences. The logs provide the instructor with input that is useful in the continuous improvement process of refining the course.

IMPLEMENTATION PROCESS-- THE PROBLEMS BEGIN!

The implementation process was a long, arduous endeavor. Two days before classes were to begin, the room had no furniture, no hardware, and insufficient electrical power. The text which was ordered was not yet available nor were the various videos and software applications and demos that were to accompany the text and had been included in the curriculum. Time to quickly regroup!

A great deal of thought was given to canceling the course for the current term. This was discouraged by the MBA office because of problems with rescheduling the enrolled students. Because a holiday followed the first week of class, thus giving a two-week period to get everything in and installed, the decision was made to continue with the class. All enrolled students were called and the current situation explained. Each student was given the opportunity to drop the class with the knowledge that the problems could conceivably not be resolved for the entire term. Most felt that the process would be a great learning experience and would parallel many of the problems faced in a typical system conversion in the business environment. Each stated his/her willingness to be flexible as the course unfolded, and almost all expressed excitement about the innovative approach to the curriculum.

Facilities

The furniture had been special ordered about three months prior to the beginning of the term with delivery expected in time to complete installation by the start of the term. The tables were designed specifically for use in a groupware environment. For example, monitors were recessed in order to block the contents from other participants' view, thus preserving anonymity. After much interaction with the supplier, it was finally determined that the desks would not arrive until the middle of the semester. Eight-foot tables were moved into the room and arranged in a "U shape", and the 17 inch monitors were placed on the tables with little space between them. One of the intrinsic values

of GroupSystems is the anonymity it provides. Not only did the large monitors on the tables eliminate the anonymity factor because the students could view each other's monitors, but they also completely blocked the view among the students and between the students and the instructor. This seclusion encouraged minimal class participation, students talking with their neighbors, and students using the computers when they should have been listening and contributing. The intended collaborative approach to the course was effectively eliminated until the new desks arrived.

System Problems

The computers arrived as the semester began, but the installation process for GroupSystems was fraught with problems. Even though the instructor received forty hours of training in GroupSystems which provided an understanding of the way the software worked, the training did little to prepare for installation or troubleshooting. GroupSystems is a client-server based package that is used simultaneously by a number of users and as such proved complex to install. Although the GroupSystems support people spent many hours working with us, we were unable to get the software to function. The network was operational, and there was sufficient memory and CPU speed. Hardware, software, and networking consultants were independently brought in--to no avail. The first major breakthrough came when it was discovered serendipitously that the network driver that came factory installed was a lower version than the driver version on the accompanying disk. When a more recent version of the driver was installed, it enabled the clients to communicate with the server while running GroupSystems. This was accomplished approximately one month after the term began.

The experience logs submitted by the students illustrated their frustrations. In spite of the warning before the term that the software might not be available the entire term, the students felt they were missing out on an important element of the course. They were told that most DSS classes didn't incorporate groupware, but they continued to be dissatisfied. Every class period included an explanation of what steps had been taken and a discussion of what possible courses of action could be pursued. This discussion provided a learning opportunity for the students and the instructor. When the correct network driver version was installed, GroupSystems was tested and appeared to be functioning. However, the first class activity using the package was a disaster. The response time was about a minute, and some of the machines appeared to lock up. This slow response time when the entire class was logged on was not apparent when GroupSystems was tested with three machines being used simultaneously. Now what?

GroupSystems support people verified that we had sufficient memory on the server and the workstations and that the installation appeared to have been done correctly. A patch for GroupSystems was downloaded from the Internet and installed but provided no obvious improvement. To this point, several hundred man hours had been spent working on this one lab.

Making do and finding solutions. Throughout this first half of the term, the material was covered by the traditional lecture/discussion method. Although the final versions of the videos and software that were to accompany the text were still not completed, the publisher provided the instructor with "in-progress" versions. The videos were helpful, but virtually none of the software was functioning. The Internet proved a welcomed source of demos and simple DSSs. Group projects and case studies were completed with face-to-face interaction with the hope that future projects and cases could incorporate groupware. The experience logs were completed but not using Lotus Notes as was originally intended. The students' experience logs showed continued dissatisfaction with the lack of groupware and isolated instances of discontent with the lack of participation by students during group discussions due to the visual obstruction of the large monitors.

The computer desks arrived about midterm although one arrived broken. A replacement was not available until after the term was finished. Removal of the visual obstructions brought about a complete transformation in the dynamics of the class. Class interaction immediately commenced. Each student contributed and a previously lacking synergy developed. It was amazing to observe the differences between one week and the next. It was as if it was a completely different group of participants.

The cause of the slow response time was finally identified about two months into the term. Virus scanners on both the server and the workstations appeared to be the culprits. When these were deactivated, GroupSystems finally worked! Although the problem was identified, it was not easily solved because viruses regularly crippled the labs when the scanners were disabled. The temporary solution was to deactivate the scanners before each DSS class and hope for the best.

Two of the biggest sources of student dissatisfaction with the course were now eliminated. The experience logs began to show positive feelings about the course, and the negative comments were far less significant.

More Problems--Lotus Notes

By this time, it was apparent that Lotus Notes would not be functional during this term. Not only was the package not yet installed, but also the learning curve for the instructor was found to be much steeper than anticipated. Four days of training had been completed, but that was not sufficient to do those activities originally planned. A great deal of up-front work would be required in order to accomplish them. Students were informed that this element of the course was to be eliminated. They were disappointed, but by this time, they were not surprised.

The initial semester ends. The end of the term thankfully arrived. The instructor evaluations reflected the frustrations of the students, although most indicated they had learned a great deal and the course was very valuable.

The disappointment of the students did not come close to matching the frustration, anger, concern, and stress experienced by the instructor! Any new course requires extensive preparation, and the instructor learns a great deal the first time through. However, a new course with new hardware, software, and furniture and all the associated problems makes for a challenging semester. Once the semester is completed, the important thing is what was learned by the instructor to make the next semester a more positive experience for all concerned.

CHANGES TO CURRICULUM

Although the goals of the course remained constant, experiences from the initial semester fostered changes to the course content and methods of delivery. The collaborative activities, while still considered an important component, were slightly de-emphasized. Both projects were still team based as a result of the meaningful contributions of this learning technique. While all the casework had been previously completed in teams, the updated requirements allowed for a choice on several of the cases between teamwork and individual work. This was in response to dissatisfaction with unequal participation from all team members. Although one component of the case grading process including team members dividing 100 points among the team members for participation, it didn't alleviate the frustration over some team members having to do the majority of the work. Although this was discussed as a relatively insignificant weakness in most team efforts with advantages outweighing this disadvantage, several students chose to work on the cases independently.

Experience logs were still required. Although they were not completed using Lotus Notes as originally planned for the first course, the input and responses provided by weekly logs was too valuable to eliminate.

GroupSystems was to play an important role in the second semester. With its previous emphasis as a support tool, its mastery would now become an end in itself. As industry is becoming more aware of group decision support tools, the ability to design, develop, and facilitate a session becomes more important.

Lotus Notes was installed between semesters. An exposure to some of its capabilities and uses were given in the second semester. Hands-on experience was minimal including only the mail function and personal tools. Although class time didn't permit in-depth coverage, students were particularly anxious to explore this group decision support software. The joint case study with the teams from Mexico, that was originally intended to be facilitated by Notes, was removed as a goal for the second semester and hopefully will be included in future courses.

Because students' experience logs and final class evaluations indicated that the students had the best understanding of those topics which had been assigned to them as their group projects, additional technology-based learning seemed appropriate. A component was added which had each student "surf the Net" to find information about each weekly topic in preparation for class discussions. This activity proved to be very well received and enhanced the topic discussions. Demos on various DSSs such as executive information systems, intelligent agents, and expert systems were found on the Internet and used to demonstrate the topics. Without these, each of the topics would have been much less meaningful. During this second semester, the software that accompanied the text arrived and included useful demos.

LESSONS LEARNED AND RECOMMENDATIONS

Through experience and a great deal of "trial and error", valuable insight was gained to enhance subsequent offerings of the course. The following suggestions are products of "lessons learned the hard way."

- Don't start a course until the technology and facilities are functional.

  Include slack time in the installation schedule to allow for delivery delays, non-functioning and damaged equipment, and other unforeseen problems.

- Test, test, test (The system, not the students' patience)

  Allow time and allocate manpower to test the system under class conditions. On several occasions, problems that were resolved when testing with two or three workstations reappeared under the load of the entire class.

- Be vary of publishers' promises

  Don't adopt a textbook based upon promises from publishers particularly when software is included and essential. Publishers experience many of the same difficulties that were encountered during this course implementation, and their problems become yours. If the book and accompanying materials are not completely finished, adopt something that is.

- Learn from the experience of others

  Seek those with similar environments. Although businesses that used GroupSystems were consulted, they did not experience the same set of problems as those associated with student labs. For example, the virus scanners were not recognized as a possible problem because the businesses did not use them.

- Have contingency plans

  Regardless of the amount of testing that has been done prior to class, problems WILL occur. The class experiences far fewer frustrations if a new activity is immediately begun with the problem to be solved in time for the next class.

- Keep experience logs

  The logs provide valuable information to help meet students' expectations both during the current term and for future terms. Both successful and unsuccessful experiences need to be included. The instructor must be sure to address all concerns even if it's simply to explain why something was or was not done a particular way.

- Keep the faith--the effort is worthwhile

  Student logs and course evaluations from the second semester indicated that the course was a very beneficial and enjoyable one. They felt that the concepts learned from the course would enable them to function better in the business community.

CONCLUSIONS

There was a semester of great wailing and gnashing of teeth, and a semester of significant transition--that's the bad news. The good news is that the resulting course will provide significant benefits for students for many semesters to come.

Now that the course is functioning smoothly, students benefit from the following:

- Interacting with technology (Internet, GroupSystems, and Lotus Notes)
- Learning current and emerging topics
- Enhancing teamwork, collaboration and communications skills

According to student critiques, these benefits are gained through a process that is interesting, enjoyable and rewarding.

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APPENDIX A

The following syllabus has listed in parentheses and italics those changes that were made after the first time the course was taught. The syllabus for the second semester the course was taught reflected those changes.

DECISION SUPPORT SYSTEMS
CIS 615

Course Description:

The course explores the principles and application of decision support information systems with a focus on those decision support systems currently used in business. Executive information systems, expert systems, artificial intelligence, and groupware will be covered. Additional DSSs will be added to the course as they are implemented in business.

Course Goals:

The goals of this course are to:

- Teach DSS concepts, including their proper applications.
- Improve students' interpersonal and communication, teamwork, creative thinking and problem-solving skills.

Course Objectives:

- The student will be able to understand, synthesize and apply the following DSS concepts:
  Data management
  Decision modeling
  Group decision support systems
  Executive information systems
  Expert systems
  Artificial intelligence
  Data warehousing
  Data mining
  (Databases for decision support
  Intelligent agents
  OLAP
  Ethical issues)
- The student will be able to work collaboratively on a variety of activities.
- The student will be able to use (Notes and) GroupSystems for collaborative activities and know when the use of each is appropriate.
- The student will be able to use DSS tools, such as spreadsheets and databases, to make decisions.
- (The student will be able to collaborate with an International group.)

Textbook:

Decision Support for Management, Sprague and Watson, Prentice Hall, 1996.

Grading:

Grading Scale:

A = 90- 100
B = 80-89
C = 70-79
D = 60-69
F = Below 60

Grading Procedures:

A final grade for this course will be determined based upon the following criteria:

Case studies 35% (20%)

Nine (five) case studies will be done in class within groups. The groups will prepare the cases either using GroupSystems to facilitate collaboration or through face-to-face collaboration. All students will have the opportunity to participate in both methods of collaboration. The cases will be assigned during the previous class to provide time for reading before the class analysis. Grades will be based on thoroughness, accuracy, and presentation. Each member of the group will receive the same grade.

Group projects 30%

Two 30-minute group projects will be assigned on topics related to the DSS field. (Each student will prepare one presentation using face-to-face collaboration and one presentation using Notes for collaboration) Group projects will be graded on both the presentation and the submitted paper. Each member of the group will receive the same grade. Group members will evaluate the participation efforts of their individual team members. Less than equal participation will affect the participation grade.

Experience diary 10%

Each student will maintain a weekly dairy of their thoughts about their class-related experiences. The diaries will be completed using Notes. The students will record the main concepts covered in the class, concepts that need additional coverage, effective activities with suggestions for improvement, and problems encountered including possible solutions.

Grade will be based upon completeness.

Final exam 10%

(Midterm Exam 15% and Final Exam 15%)

A final exam will be given on the material covered in the course. The exam will consist of short answer and essay questions. The exam will consist of three parts. One part will be completed with face-to-face collaboration, one part using GroupSystems for collaboration, and one part by individual effort.

Participation 15% (10%)

Students will rate their team members on all participatory activities. Each student will divide 100 points among their team members reflecting their perception of each individual's participation towards the group activity.

(Students will be responsible for using the internet to become familiar with each topic in order to participate in class discussions.)

Students will complete weekly class evaluation forms.

Attendance Policy:

Although attendance is not required, the students is responsible for information and activities covered in class.

Participation grade will be affected for those activities that are missed.